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[List of Appended Documents]
[Document Name] Claim 1
[Document Name] Specification 1
[Document Name] Abstract 1

[Document Name] Claims

[1] An endurance improving agent comprising catechins as an active ingredient.

[2] An antifatigue agent comprising catechins as an active ingredient.

[Document Name] specification

[Title of the Invention] Endurance Improving Agent

[Field of the Invention]

[0001] This invention relates to endurance improving
5 agents and antifatigue agents for physical activities
 in broad sense, including exercises and labor.

[Background of the Invention]

[0002] Improving endurance and suppressing fatigue in
 association with exercise or labor are strongly required
10 for physical activities in broad sense, such as exercises
 requiring endurance and labor requiring repeated muscle
 exercise.

[0003] From such a viewpoint, a variety of probes have
 been conducted with the aim of obtaining ingredients
15 effective for improving endurance and suppressing
 fatigue. For example, ganoderma lucidum components
 (Patent Document 1), *Crataegus cuneata* Sieb. et Zucc.
 fruit extract (Patent Document 2) and the like have been
 reported as ingredients capable of improving endurance.
20 As antifatigue agents, biotin (Patent Document 3),
 certain amino acid compositions (Patent Document 4),
 2-ketoglutaric acid (Patent Document 5) and on the like
 have been reported.

[0004] In the meantime, catechins contained in green tea,
25 grapes, cacao beans and the like have been reported to

have physiological benefits, such as
cholesterol-level-increase-inhibiting effect (Patent
Document 6), α -amylase-activity-inhibiting effect
(Patent Document 7),
5 blood-sugar-level-increase-inhibiting effect (Patent
Document 8), arteriosclerosis-preventing effect
(Patent Document 9), antioxidative effect (Patent
Document 10), antimicrobial effect (Patent Document 11),
blood-pressure-increase-suppressing and
10 enzyme-activity-inhibiting effects (Patent Document
12), antiulcer effect (Patent Document 13), and
mutation-inhibiting effect. However, nothing is yet
known as to what effects catechins might bring in
endurance and fatigue upon exercises.
15 [Patent Document 1] JP-A-05-123135
[Patent Document 2] JP-A-08-047381
[Patent Document 3] JP-A-06-305963
[Patent Document 4] JP-A-07-025838
[Patent Document 5] JP-A-10-175855
20 [Patent Document 6] JP-A-60-156614
[Patent Document 7] JP-A-03-133928
[Patent Document 8] JP-A-04-253918
[Patent Document 9] JP-A-04-352726
[Patent Document 10] JP-B-01-044234
25 [Patent Document 11] JP-A-02-276562

[Patent Document 12] JP-A-03-133928

[Patent Document 13] JP-A-63-277628

[Disclosure of the Invention]

[Problem to be solved by the Invention]

5 [0005] An object of the present invention is to provide
an endurance improving agent and an antifatigue agent
for physical activities.

[Means for Solving the Problem]

10 [0006] The present inventors have conducted an
investigation about physiological effects of catechins,
and as a result, have unexpectedly found that catechins
have excellent endurance improving effect and
antifatigue effect.

15 [0007] Specifically, the present invention is to provide
an endurance improving agent and an antifatigue agent
containing catechins as an active ingredient.

[Effect of the Invention]

20 [0008] According to the present invention, there are
provided drug and foods, which have endurance improving
effect and fatigue-suppressing effect for physical
activities in broad sense, such as exercises requiring
endurance, labor requiring repeated muscle exercise and
the like.

[Best Mode for Carrying out the Invention]

25 [009] In general, the term "catechins" is a generic term,

which encompasses catechin, gallocatechin, catechingallate, gallocatechingallate, epicatechin, epigallocatechin, epicatechingallate and epigallocatechingallate. In the present invention, catechins may contain one or more of these compounds.

[0010] Catechins, ingredients for use in the present invention, can be extracted from tea leaves prepared from crude tea leaves of the Genus *Camellia*, such as *C. sinensis*, *C. assamica* or the Yabukita variety, or a hybrid thereof, with water or hot water, and in some instances, the extraction can be conducted with an extraction aid added to water or hot water. Such prepared tea leaves include (1) green teas such as *sencha* (middle-grade green tea), *bancha* (coarse green tea), *gyokuro* (shaded green tea), *tencha* (powdered tea) and *kamairicha* (roasted tea); (2) semi-fermented teas such as *tekkannon* (*Teguajin*), *irothane*, *ougonkei* (*huang jin gui*) and *buigancha* (*Wuyiyancha*), all of which are collectively called "oolong tea"; and (3) fermented teas called "black tea", such as Darjeeling, Ceylon Uva and Chinese Keemun. As an extraction method of tea, the extraction can be effected by a conventional method such as stirring extraction. Upon extraction, an organic acid or an organic acid salt such as sodium ascorbate may be added to water. It is also possible to make

combined use of boiling deaeration or an extraction method which is conducted while bubbling an inert gas such as nitrogen gas to eliminate dissolved oxygen, that is, under a so-called non-oxidizing atmosphere.

5 Instead of directly extracting from tea leaves, it is also possible to add a concentrate or purified product of a tea extract.

[0011] The term "the concentrate of a tea extract" as used herein means one obtained by concentrating an
10 extract of tea leaves in hot water or a water-soluble organic solvent, while the term "the purified product of a tea extract" as used herein means one obtained by conducting purification with a solvent and a column. Examples thereof include those prepared by the processes
15 exemplified in detail in JP-A-59-219384, JP-A-04-020589, JP-A-05-260907, JP-A-05-306279 and so on. Commercially-available products include "POLYPHENON" (product of Tokyo Food Techno Co., Ltd.), "TEAFURAN" (product of ITO EN, LTD.), "SUNPHENON"
20 (product of Taiyo Kagaku Co., Ltd.), "SUN OOLONG" (product of Suntory Limited), etc. As catechins, on the other hand, it is possible to use products obtained from other raw material sources, for example, grapes and products obtained by processing grapes such as wine,
25 juice or the like, cacao beans and those obtained by

processing cacao beans as a raw material, and even chemically synthesized products. As the forms of a concentrate of a tea extract and a purified product of a tea extract, various forms can be mentioned such as solids, aqueous solutions and slurries. As a liquid for dissolving or diluting the concentrate of the tea extract or the purified product of the tea extract, water, carbonated water, a conventional tea extract or the like can be mentioned.

10 [0012] As catechins, a concentrate of a tea extract or a purified product of a tea extract is generally used. In particular, the use of a concentrate of a green tea extract or a purified product of a green tea extract is preferred.

15 [0013] As demonstrated in Examples to be described subsequently herein, catechins have endurance improving effect, for example, such as capability of extending the maximal running time, thereby materializing advantageous effects such as the prevention or the like of muscle fatigue or body fatigue.

20 Accordingly, catechins can be a material of foods or drug for human or animal as an endurance improving agent or an antifatigue preventing/improving agent.

[0014] The endurance improving agent or the like according to the present invention can be administered to humans and animals, and in addition, foods and beverages, drug, pet foods and the like containing the endurance improving agent or the like of the present invention can be ingested. Applicable foods include foods and beverages intended to act on physiological functions, for example, to improve endurance or to prevent or ameliorate fatigue, invalid diets, and specific health foods. When employed as drug, it can be formulated, for example, into oral solid preparations such as tablets and granules and oral liquid preparations such as internal liquid medicines and syrups.

To prepare an oral solid preparation, an excipient and, if necessary, a binder, disintegrator, lubricant, colorant, taste corrigent, aroma corrigent and/or the like are added to catechins, and the resulting mixture is prepared into tablets, coated tablets, a granule, a powder, capsules or the like by a method known *per se* in the art. To prepare an oral liquid preparation, on the other hand, a taste corrigent, buffer, stabilizer, aroma corrigent and/or the like are added, and the resulting mixture is prepared into an internal liquid preparation, a syrup, an elixir or the like by a method known *per se* in the art.

[0015] The content of catechins in each of the
above-described preparations differs depending on the
manner of its used. In the case of a beverage or food,
a pet food or the like, the content can generally be
5 set, preferably at from 0.01 to 5 wt%, more preferably
from 0.05 to 5 wt%, still more preferably from 0.1 to
1 wt%. In the case of drug other than those described
above, for example, an oral solid preparation such as
tablets, granules or capsules or an oral liquid
10 preparationsuchasaninternalliquidmedicineorsyrup,
the content can generally be set, preferably at from
0.01 to 95 wt%, more preferably from 5 to 95 wt%, still
more preferably from 10 to 95 wt%.

[0016] The daily dose (effective ingestion) of the
15 endurance improving agent or the like according to the
present invention can be set preferably at from 100 to
3,000 mg/60 kg-body weight, more preferably at from 250
to 2,000 mg/60 kg-body weight, still more preferably
from 250 to 1,000 mg/60 kg-body weight.

20 [Examples]

[0017] Test 1 (endurance improving effect and antifatigue
effect of catechins for rats)

As catechins, "POLYPHENON 70S" widely available
on the market was obtained from Tokyo Food Techno Co.,
25 Ltd., and was used in the test.

[0018] After each rat (SD strain, male, 6 weeks old) had been allowed to acclimatize himself to treadmill running for 2 weeks, its maximal running time was measured. The measurement was started after the rat had been allowed to rest in a treadmill and to acclimatize itself to the environment. The belt speed was set firstly at 12 m/min, and the measurement was conducted at speeds of 12, 15 and 18 m/min, each for 10 minutes, at a speed of 21 m/min for 30 minutes, at a speed of 22.5 m/min for 1 hour, and thereafter, at a speed of 24 m/min. A time point at which the rat became no longer able to run was considered to be its maximal running time, and that time was recorded. To avoid any intergroup difference in maximal running time, the rats were divided into two groups, each consisting of 10 rats. With feeds prepared in accordance with the compositions shown in Table 1, those rats were reared respectively. After reared for 2 weeks, the maximal running time of each group was measured. The maximal running time of the rats at that time are shown in Table 2.

[0019] [Table 1]

Feed Composition (wt%)

	Test feed	Control feed
Casein	20	20
DL-methionine	0.2	0.2
Fat	10	10
"POLYPHENONE 70S"	0.5	0
Minerals	4	4
Vitamins	2.2	2.2
Cellulose powder	8.1	8.1
Potato starch	55	55.5
Total	100	100

[0020] [Table 2]

Maximal running time of rats before and after reared for 2 weeks

5

	Before reared		After reared for 2 weeks	
	Maximal running time (min)	SSD**	Maximal running time (min)	SSD**
Control feed	109.4±15.9		120.7±17.6	
Test feed	110.1±14.9	N.S.*	149.3±26.5	P<0.05*

* Statistical significance of difference between the test feed and the control feed

** SSD: Statistical significance of difference

[0021] It is appreciated from the results of Table 2 that

10

compared with the rats which ingested the control feed, the rats which ingested the feed containing catechins were significantly long in the maximal running time after being reared for 2 weeks and therefore, that endurance

improving effect and fatigue suppressing effect were observed on the feed containing catechins.

[0022] Test 2 (endurance improving effect and antifatigue effect of catechins for mice)

5 As catechins, "POLYPHENON 70S" widely available on the market was obtained from Tokyo Food Techno Co., Ltd., and was used in the test.

[0023] After each mouse (BALB/c strain, male, 6 weeks old) had been provisionally reared for 1 week, its maximal swimming time was measured twice. The mouse was caused to swim at a flow rate of 7 L/min. A time point at which the mouse became no longer able to swim was considered to be his maximal swimming time, and that time was recorded. To avoid any intergroup difference in maximal swimming time, the mice were divided into two groups, each consisting of 10 mice. With the feeds prepared in accordance with the compositions shown in Table 1, those mice were reared respectively. While rearing them for 5 weeks, the maximal swimming time of each group was measured once a week. The maximal swimming time of the mice at that time is shown in Table 3.

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[0024] [Table 3]

Maximal swimming time of mice before and after reared for 4 weeks

	Before reared		After reared for 4 weeks	
	Maximal swimming time (min)	SSD**	Maximal swimming time (min)	SSD**
Control feed	26.5±3.73		31.0±6.35	
Test feed	26.8±3.89	N.S.*	40.5±10.8	P<0.05*

* Statistical significance of difference between the test feed and the control feed

** SSD: Statistical significance of difference

[0025] It is appreciated from the results of Table 3 that compared with the mice which ingested the control feed, the mice which ingested the feed with catechins added therein were significantly long in the maximal swimming time after reared for 4 weeks and therefore, that endurance improving effect and fatigue suppressing effect were observed on the feed with catechins added therein.

[Document Name] Abstract

[Abstract]

[Problem]

To provide an endurance improving agents or an
5 antifatigue agents for physical activities in broad sense,
such as exercises requiring endurance, labor requiring
repeated muscle exercise, and the like.

[Means for Solving the Problem]

An endurance improving agents and an antifatigue agents,
10 all of which contain catechins as an active ingredient.

[Drawings] None